

1.3 PROCESS OVERVIEW

The carbon reactivation process consists of a multiple hearth reactivation furnace, a natural gas fired afterburner used to destroy organic contaminants released from the carbon, a wet quench, venturi scrubber, packed bed scrubber, and wet electrostatic precipitator.

1.4 TEST OBJECTIVES AND APPROACH

The WCAI Performance Demonstration Test Plan has been prepared to provide comprehensive performance testing of the RF unit to demonstrate compliance with the applicable HWC MACT emission standards and to gather data for use in a site-specific risk assessment. The objectives of the PDTP are to demonstrate regulatory compliance with standards such as Destruction and Removal Efficiency (DRE) and particulate matter emission concentration, while operating at “worst case” conditions processing normal feed materials, which have been augmented with metals, chloride, etc., to establish operating conditions that will be included in the permit. More specifically, the objectives of the Performance Demonstration Test (PDT) are as follows:

1. Demonstrate Compliance with Applicable USEPA Regulatory Performance Standards (Based on HWC MACT Standards for Existing Hazardous Waste Incinerators):
 - Demonstrate a DRE of greater than or equal to 99.99% for the selected principal organic hazardous constituents (POHCs) chlorobenzene and tetrachloroethene.
 - Demonstrate stack gas carbon monoxide concentration less than or equal to 100 ppmv, dry basis, corrected to 7% oxygen.
 - Demonstrate stack gas hydrocarbon concentration of less than or equal to 10 ppmv, as propane, dry basis, corrected to 7% oxygen.
 - Demonstrate a stack gas particulate concentration less than or equal to 34 mg/dscm (0.015gr/dscf) corrected to 7% oxygen.
 - Demonstrate that the stack gas concentration of hydrogen chloride (HCl) and chlorine (Cl₂) are no greater than 77 ppmv, dry basis, corrected to 7% oxygen, expressed as HCl equivalents.
 - Demonstrate that the stack gas mercury concentration is less than or equal to 130 µg/dscm, corrected to 7% oxygen.
 - Demonstrate that the stack gas concentration of semivolatile metals (cadmium and lead, combined) is less than or equal to 240 µg/dscm, corrected to 7% oxygen.

1.5 TEST PROTOCOL SUMMARY

In order to accomplish the PDT objectives, (i.e., demonstrating that the unit will meet all applicable environmental performance standards) a single test condition representing “worst case” operations of minimum temperature, maximum combustion gas velocity (minimum residence time), and maximum waste feed rate will be performed. The test will consist of at least three replicate sampling runs.

A summary description of the testing conditions, analytical parameters, and sampling methods follows:

1.5.1 Test Condition 1 (“Worst-Case” Operations)

Sampling and monitoring protocols that will be utilized while carrying out the performance test are summarized as follows:

- Spent Activated Carbon Feed - total chlorine/chloride, elemental (C, H, N, O, S, moisture), volatile organics, semivolatile organics, and total metals (Al, Sb, As, Ba, Be, Cd, Cr, Co, Cu, Pb, Hg, Ni, Se, Ag, Tl, V, Zn)
- Makeup Water - volatile organics, semivolatile organics, and total metals (Al, Sb, As, Ba, Be, Cd, Cr, Co, Cu, Pb, Hg, Ni, Se, Ag, Tl, V, Zn)
- Caustic feed to APC - volatile organics, semivolatile organics, and total metals (Al, Sb, As, Ba, Be, Cd, Cr, Cu, Co, Pb, Hg, Ag, Tl, Se, Ni, V, Zn)
- Scrubber Blowdown - volatile organics, semivolatile organics, and total metals (Al, Sb, As, Ba, Be, Cd, Cr, Co, Cu, Pb, Hg, Ni, Se, Ag, Tl, V, Zn)
- Wastewater Discharge to POTW - volatile organics, semivolatile organics, and total metals (Al, Sb, As, Ba, Be, Cd, Cr, Co, Cu, Pb, Hg, Ni, Se, Ag, Tl, V, Zn)
- Stack gas particulate, HCl, and Cl₂ using EPA Method 26A
- Stack gas target volatile organics using VOST, SW-846 Method 0030
- Stack gas target semivolatile organics and organochlorine pesticides using SW-846 Method 0010
- Stack gas PAHs and PCBs using a separate SW-846 Method 0010 sampling train
- Stack gas PCDD/PCDF using SW-846 Method 0023A
- Stack gas total volatile organics using SW-846 Method 0040
- Stack gas total semivolatile and nonvolatile organics using SW-846 Method 0010
- Stack gas metals (Al, Sb, As, Ba, Be, Cd, total Cr, Co, Cu, Pb, Hg, Ni, Se, Ag, Tl, V, and Zn) using EPA Method 29
- Stack gas hexavalent chromium using SW-846 Method 0061
- Stack gas particle size distribution using a cascade impactor

- Demonstrate that the stack gas concentration of low volatility metals (arsenic, beryllium, and chromium, combined) is less than or equal to 97 $\mu\text{g/dscm}$, corrected to 7% oxygen.
- Demonstrate that the stack gas concentration of dioxins and furans does not exceed 0.40 ng/dscm, corrected to 7% oxygen, expressed as toxic equivalents of 2,3,7,8-TCDD (TEQ). This is the applicable standard since the gas temperature entering the first particulate matter control device is less than 400°F.

2. Establish Permit Operating Limits

- Demonstrate maximum feed rate for spent activated carbon.
- Demonstrate minimum afterburner gas temperature
- Demonstrate maximum combustion gas velocity (or a suitable surrogate indicator)
- Demonstrate maximum total chlorine/chloride feed rate
- Establish a Maximum Theoretical Emission Concentration (MTEC) limit for mercury
- Demonstrate system removal efficiency (SRE) for semivolatile and low volatility metals so feed rate limits can be developed by extrapolation from test results.
- Establish appropriate operating limits for the air pollution control system components.

3. Gather Information for Use in a Site-Specific Risk Assessment

- Measure emissions of metals, including hexavalent chromium
- Measure emissions of specific volatile and semivolatile products of incomplete combustion (PICs)
- Measure emissions of polychlorinated dibenzo-p-dioxins and polychlorinated dibenzofurans (PCDD/PCDF)
- Measure emissions of polychlorinated biphenyls (PCBs)
- Measure emissions of specific organochlorine pesticides
- Measure emissions of total volatile, semivolatile, and nonvolatile organics
- Determine the stack gas particle size distribution.

- Stack gas CO and O₂ by permanently installed CEM according to the protocols in the Appendix to 40 CFR 63, Subpart EEE; Performance Specification 4B of 40 CFR 60, Appendix B.
- Stack gas total hydrocarbons (as propane) by temporary CEM according to EPA Method 25A and the protocols in the Appendix to 40 CFR 63, Subpart EEE.

1.6 DEVELOPMENT OF PERMIT LIMITS

WCAI is required to establish operating limits (applicable whenever RCRA hazardous spent activated carbon is in the reactivation furnace) in its permit to ensure that the RF system complies with the applicable USEPA environmental performance standards at all times that RCRA hazardous spent activated carbon is being treated. Under the HWC MACT, the regulations establish a comprehensive list of regulated parameters at 40 CFR 63.1209 (j) through (p) which are used to ensure continuing regulatory compliance. Other RCRA permitting guidance documents also suggest certain permit limits and means for establishing those limits. Finally, the RF has been operating since 1996 with certain limits imposed by plant operations personnel.

Considering the configuration of the RF system and the characteristics of the spent activated carbon to be fed, WCAI anticipates establishing process operational limits on the following parameters:

- Minimum afterburner gas temperature
- Maximum spent activated carbon feed rate
- Maximum total chlorine and chloride feed rate
- Maximum feed rate of mercury (based on MTEC)
- Maximum feed rate of semivolatile metals (total combined lead and cadmium)
- Maximum feed rate of low volatility metals (total combined arsenic, beryllium, and chromium)
- Minimum venturi scrubber pressure differential
- Minimum quench/venturi scrubber total liquid flow rate
- Minimum packed bed scrubber pH
- Minimum packed bed scrubber pressure differential
- Minimum packed bed scrubber liquid flow rate
- Minimum scrubber blowdown flow rate
- Minimum WESP secondary voltage